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## TROPICAL ACNE \*

FREDERICK G. NOVY, JR., M.D., *Oakland*

THE term "Tropical Acne" arose during the war to describe those cases of acne vulgaris which were seen so frequently in the military personnel serving in the hot climates. This condition differs in many respects from that of the acne vulgaris that is seen in a temperate zone. Its onset is more abrupt and it is usually more severe. The individual lesions are frequently of the cystic type so that deep-seated pustules develop, resulting in deep scarring. Cohen and Pfaff<sup>1</sup> felt that the degree of scarring in many cases at the end of eight to ten months corresponded to that seen in temperate climates at the end of five to ten years. Many of these cases were so severe that the men had to be sent back to the States.

During 1945 I was stationed at the United States Naval Receiving Hospital, San Francisco, which took care of nearly all the Navy patients coming in from overseas to that port. There I had the opportunity of observing a large number of dermatological cases coming from the Pacific.

It is interesting to note that of the total number of patients received, 7.75 per cent were dermatological patients. Considering only the medical patients, with the surgical and the neuropsychiatric cases excluded, the dermatological percentage increased to 24.53 per cent.

The importance of tropical acne is shown by the fact that in the four months from July through October, 1945, tropical acne accounted for 28.5 per cent of all dermatological cases. The only condition with a higher incidence was fungus infection which made up 29.4 per cent of the total. Thus it can be readily seen that tropical acne was a most important cause for military dermatological disability.

This incidence of the disease corresponds with the findings of Duemling<sup>4</sup> who had a similar experience at the United States Naval Hospital, San Diego. Sulzberger,<sup>5</sup> while stationed at Guam, also placed tropical acne as the second most important dermatosis, prickly heat being the first.

Because of the frequency and the severity of this disease it seemed worth while to determine, if possible, some of the underlying etiological factors concerning its development. Histories and physical examinations were done on 100 consecutive patients with tropical acne who had been returned to the United States from the tropics because of this condition.

It was found that the average age of this group was 22.75 years, which is a little older than the acne age noted in civilian life. Eleven were over 30 years of age and one of these was 41 years old. Of this older group, all gave the history that they had not been bothered with their acne for years until going overseas.

### RELATIONSHIP TO PREVIOUS ACNE

All but two of the group stated that they had formerly had acne. One of the patients who had not had previous acne was 26 years of age, with duty ashore as a tractor operator. He began to develop this disease almost immediately on going overseas and had an involvement of the back. The other, a gunner, was 20 years of age and he had developed his acne after four months overseas. The area most severely involved in this case was the buttocks.

The average age at which the previous acne started was 15.8 years. Most of the patients gave a history that this was mild, consisting of comedones which had not bothered them to any extent. Frequently they denied having had acne until they were asked if they had had "blackheads and pimples." Their present disease was

\* Read before the Section on Dermatology and Syphilology, at the Seventy-fifth Annual Session of the California Medical Association, Los Angeles, May 7-10, 1946.

so much more severe and disfiguring that it did not seem related to their previous acne.

Eighty-two gave a history of involvement of the face. In the remaining, the other sites were: neck, in eight cases, back, in six cases, and the chest in two. As stated above, two gave no previous history of acne. This is a marked contrast, as will be shown later, to the distribution of tropical acne.

#### INCUBATION PERIOD

Of this group of 100 patients, the time overseas varied from three months to 35 months, giving an average time of 14.39 months. Nine stated that they had had activity of their acne before going overseas. Fifty-three began having trouble in two months and all but ten developed the disease before six months. In general, the course of the disease was progressive and as long as the patients stayed in the tropics new lesions continued to develop and local therapy of various kinds was of little avail.

Many stated that they noticed considerable improvement in the last few days aboard ship after coming into a cooler climate. This was further substantiated during the patients' short stay at the hospital before being shipped elsewhere. Many would improve remarkably without any specific therapy. This was probably due to cooler climate and more frequent bathing.

#### SITES OF INVOLVEMENT OF TROPICAL ACNE

The cases were roughly divided into three groups according to their severity: mild, moderately severe, severe. The mild cases were those with scattered lesions which did not interfere with the carrying on of duty. The severe cases were those with many deep cystic and pustular lesions in which the extent of involvement interfered with the patient's ability to carry on. The moderately severe group were in between.

Chart I shows that 84 had involvement of the back. The chest and neck were next most frequently involved. The face had activity in only 28. This is in marked contrast to the history of previous acne in which 82 had had the face involved. In relation to this difference between the

CHART I.—*Distribution of Lesions in 100 Cases of Tropical Acne.*

Affected Area	Mild	Moderate	Severe	Total
Back .....	21	37	26	84
Chest .....	10	20	24	54
Neck .....	10	22	17	49
Face .....	5	11	12	28
Buttocks .....	3	3	4	10
Shoulders .....	2	5	2	9
Arms .....	1	5	3	9
Legs and thighs .....	1	0	3	4

sites of activity of juvenile acne and tropical acne, it was frequently noticed that the sites of the old acne were not exacerbated and frequently were clear while new areas showed extensive involvement. For example, a patient would have scars on his face and a few comedones of his previous acne while his shoulders and back would be covered with deep cystic, pustular and granulomatous lesions.

#### TYPE OF DUTY

In attempting to determine what factors play a role in this disease, the kind of work performed is most important. It is generally believed that hot and greasy occupations are predisposing causes of acne. It should be mentioned here that tropical acne does not resemble the oil acne and chloracne of industry which involves, for the most part, the arms and legs and is due to the presence of some irritating substance.

It was found that out of this group of 100, 42 had duty aboard ship and 58 duty ashore. Of the group aboard ship, 37 per cent were on general detail above decks which, for the most part, is clean duty. In addition, there were others working as radio operators, in small boat crews, etc., who could also be classified as having clean duty. There were only two machinists and one cook in the entire group.

Of the 58 based ashore, 21 had duties which could be considered dirty; namely, motor drivers, machinists and stevedores. The others had "clean" duty, working as guards, mailmen, pharmacists' mates and communicators. Thus it appears obvious that the duties in themselves were not primary factors in the development of acne.

#### CLOTHING

There has been some discussion as to what part clothing plays in precipitating acne in the tropics. As has been noted, this form of acne is common on the normally covered parts; namely the back and shoulders. Some have felt that going without shirts and excessive exposure to the sun might explain the disease in part. Others have thought that the wearing of shirts in the tropics was detrimental because it did not allow tanning to take place which should help control the disease and that the rubbing of the shirt on the perspiring skin would cause irritation and result in the formation of pustules.

For these reasons, 36 patients were questioned about the wearing of shirts. It was found that 21, or 58 per cent, did not wear them most of the time, while 15, or 41 per cent, did. It is my impression that these percentages were about the same as those seen among the entire personnel and it does not appear that either the wearing or not wearing of shirts has any relationship to the development of tropical acne.

#### BLOOD CHLORIDES

It has been suggested by Carpenter<sup>1</sup> that the excessive heat might cause a disturbance of blood chlorides which might be a factor in the causation of tropical acne. For this reason determinations of blood chlorides on 50 consecutive cases were done as soon as possible after arrival in this country. As controls, 50 neuropsychiatric patients with clear skin were used. These were chosen, as much as possible, from the same incoming draft as the acne patients so that all would have experienced approximately the same climatic conditions. Blood chlorides were deter-

mined by the Whitehorn method.<sup>2</sup> Chart II shows there was no significant difference between the two groups.

CHART II.—*Blood Chloride Determinations.*

	Average Time Overseas	Blood Chlorides— Mg. per 100 cc.		
		Average	Highest	Lowest
Acne patients . . .	14.39 mo.	460.52	594	346
Controls . . . . .	18.64 mo.	468.53	594	346

#### COMMENT

In the 100 cases of tropical acne studied there is only one common factor which stands out as the primary cause for the development of the disease, and that is excessive heat. It seems reasonable to assume that, with the terrific heat, the sebaceous glands are over-stimulated, resulting in plugging of the ducts leading to comedone formation and, secondarily, to cysts and pustules. It is generally thought that prickly heat is developed on the basis of over-activity of the sweat glands.

When one considers other possibilities, such as diet, it should be remembered that for the most part the armed forces had an adequate, well balanced diet and that the food aboard ship and in established naval bases was ample in regard to fresh vegetables and meat.

It has been shown in the article that the type of duty played no significant role and those performing all types of work were afflicted. Interestingly enough, most of the men had what would be described as clean duty and those doing excessively hot and oily jobs were in the minority.

Lowering of blood chlorides from excessive heat was not found in those suffering from the disease, as all of the determinations were found to be within normal limits.

The length of time overseas appears to be unimportant in itself as over three-quarters of the patients developed their acne within the first six months, suggesting an individual susceptibility rather than duration of exposure to tropical climate.

The question of bathing facilities naturally arises. For the most part, in the Navy, it was well taken care of. Those aboard ship had access to good bathing facilities, as did those at shore bases after they had once been established. Of course, this was not true in the front lines, but most of these cases were not performing that type of duty.

#### SUMMARY

Tropical acne is a common, severe skin disease accounting for 28.5 per cent of the dermatological cases sent home from overseas.

It was nearly always seen in those having suffered from previous, usually mild, acne vulgaris. It differs from acne vulgaris of the temperate zones in its rapid development, and it is of a deep cystic, indurated type which leaves mutilating scarring of the affected areas. Tropical acne is seen most frequently on the back, shoulders and neck, whereas the usual acne vulgaris most commonly involves the face.

Excessive heat which over-stimulates the seba-

ceous glands appears to be the chief factor in the development of tropical acne.

The recent war has shown that those suffering from acne vulgaris should not be sent to the tropics because, with many, the disease is aggravated and severe scarring results.

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#### Discussion by COMDR. W. W. DUEMLING\*

I feel it a privilege to be permitted to open the discussion of this paper, which brings before us one of the major dermatologic problems of the past war. As has been pointed out, in warfare fought over the jungle terrain of the islands of the South Pacific, where man must often be his own pack animal, the presence of cystic nodules and draining sinuses of the neck, upper back and shoulders, seriously affected his fighting efficiency and necessitated his evacuation to the States for treatment and disposition.

As Dr. Novy has shown in the series of cases which he studied, almost all these men had had a mild acne beginning in adolescence; so mild that they never consulted a physician for treatment. However, coincident with their arrival in the tropics, the lesions progressed rapidly, undoubtedly because of the increased activity of the sebaceous glands and the conditions of heat and humidity which favor bacterial growth. It was comparable to placing these men in a favorable medium in an incubator, and the results were as Dr. Novy has just shown us.

In relation to Dr. Novy, we at the San Diego Naval Hospital were at the end of the line, and large numbers of these men were transferred to our hospital for treatment and disposition. The peak of their numbers reached us in late 1943 and 1944 and at that time Admiral Chester M. Nimitz was quite unhappy with the physical quality of the manpower making up his fighting machine and directed that these men not be returned to the tropics. Acting on this directive, I released via medical discharge such a large number that my commanding officer was quite disturbed and asked to see these patients because he could not conceive of acne (which in his conception amounted to a few adolescent pimples) being a disabling condition. When he saw them he was amazed at the extent of the eruption and the disfiguring scarring.

Since our problem was to return these men to duty or civilian life, I would like to make a few remarks about the therapy of these cases. With such large numbers of patients to treat, we adopted a routine consisting of daily bathing, followed by evacuation of the superficial pustules and comedones, and the application of Lassars paste containing 2 per cent resorcin and 10 per cent precipitated sulphur. A high percentage of the mild cases were entirely controlled with this procedure. An excellent adjuvant used in all cases was electrodesiccation of comedones and superficial pustules. In a few days the crusts came away, and the involution process was speeded up materially. This can be recommended most highly.

\* Medical Corps (USNR), U. S. Naval Hospital, San Diego, California.

In the more severe cases dietary restrictions were imposed, and the use of penicillin both intramuscularly and as a local infiltration in and around the larger indolent nodules was resorted to, with striking improvement. It was noted, however, that relapses were likely to occur if the penicillin therapy was discontinued too soon. We could see no particular benefit from the use of intravenous saline as advocated by Carpenter.

In large, recurrent cystic nodules of the neck and face we resorted to exteriorization or saucerization previously described by me.<sup>4</sup> Briefly this consisted of removal of the roof of the cyst, packing the cavity with iodoform gauze and allowing the base to heal over, resulting in a smooth, flat scar, rather than the rolled up or puckered scar seen as a sequel to multiple attempts at incision and drainage.

Discussion by H. V. ALLINGTON, M.D., *Oakland*

I am sure that all of us who observed service personnel in or recently returned from tropical areas agree

that "tropical acne" is a severe and often disabling skin disease. Dr. Novy's careful analysis of patients returning from the Pacific theatre shows how important this condition was during the recent war.

The fact that 98 per cent of his patients gave a history of acne vulgaris prior to going to the tropics suggests that in spite of the difference noted in this paper "tropical acne" is acne vulgaris modified slightly and in a severer form.

I believe that the type of skin one inherits, with particular reference to the character of the pilo-sebaceous apparatus, is the major factor in determining whether or not he will develop acne vulgaris. Dr. Novy's data tend to rule out diet, type of duty, clothing, cleansing facilities, and altered blood chlorides as causes of the exacerbation of acne in the tropics. I agree with him that heat and humidity resulting in further dysfunction of the sebaceous gland apparatus is the chief cause of acne vulgaris' assuming its tropical form.

## Some Fundamentals in Estrogen Therapy\*

S. CHARLES FREED, M.D., *San Francisco*

IN recent years the development of estrogen therapy has proven so satisfactory that it now ranks as one of the most valuable therapeutic procedures in endocrinology. The indications for estrogens are definite and clear-cut and their application is quite wide. Large numbers of women in the menopause, for instance, have obtained gratifying relief from their distressing symptoms. Not only are the typical symptoms of the menopause alleviated by this specific therapy, but considerable aid is obtained in the treatment of the allied functional disorders.

The physician today has a wealth of estrogenic products from which to choose, including synthetic products which offer unlimited dosage at reasonable expense. The most useful estrogens are those which are administered by mouth and by injection. Other methods of administration, such as sublingual or percutaneous, are of lesser importance.

In choosing between oral and injectable preparations certain factors should be analyzed. Oral administration is useful where frequent dosage is required, such as in amenorrhea where the pelvic tissues require a rapid stimulus to growth, in the suppression of lactation where intensive daily treatment is essential, in certain types of excessive uterine bleedings, in the resistant menopausal patient where the oral estrogen may supplement the parenteral ones, and in carcinoma of the prostate where likewise intensive treatment is desired. Oral administration is also valuable when small doses are sufficient to produce results, but where it is inconvenient for the patient to visit

the doctor's office over a long period of time. These conditions include the menopause, certain types of abnormal bleeding, especially in the premenopausal group, and in dysmenorrhea where small daily dosages are effective by suppressing ovulation, apparently an essential feature of functional dysmenorrhea.

Choice of the oral estrogens depends to a great extent upon the personal experience of the physician, since all of them are effective at the proper dosage level. The comparative potency of oral estrogens can be demonstrated by comparing them to a standard of 1 mg. of diethylstilbestrol. Then the dosages of the following estrogens are approximately equally as potent:

hexestrol .....	5 meg.
benzestrol .....	5 mg.
estrone .....	2 mg.
estradiol .....	2 mg.
estrone sulfate .....	2 mg.
ethinyl estradiol .....	0.1 mg.

Such a comparison is made on the basis of producing subjective relief in the menopausal patient under controlled conditions, and not by laboratory assay where there are extremely wide variations in results from different laboratories.<sup>1</sup> Diethylstilbestrol is probably the most toxic of these agents; the toxicity of all the others is approximately equal, amounting to about 50 per cent of that obtained with a similar therapeutic level of diethylstilbestrol. This toxicity, which produces nausea, vomiting, nervousness, dizziness, is dependent upon the rate of absorption of the estrogen and is not the result of any tissue damage. Physiologically, and often clinically, the side reactions are similar to those of early pregnancy where a high level of estrogen appears in the body tissues.<sup>2</sup>

\* Read before the Section on General Medicine at the Seventy-fifth Annual Session of the California Medical Association, Los Angeles, May 7-10, 1946.

From the Department of Medicine, Mt. Zion Hospital, San Francisco.